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X-Ray Observations of the Symbiotic Star CH Cygni
Contract (3058-001) Final Report

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The Symbiotic Star CH Cygni was observed with the ASCA X-ray satellite on October 19, 1994. CH Cyg is a triple system consisting of an symbiotic binary star (M6III + white dwarf or hot star) and a third unseen star. Very soft X-ray emission had previously been detected in several symbiotic stars, including CH Cyg. Previous detections of CH Cyg include an EXOSAT detection in 1985 (f~1.4x10^-11 erg/cm^2/sec, kT~0.1 KeV and col density~4x10^20 cm^-3) and a ROSAT detection in 1991 with comparable xray fluxes. CH Cyg is also know to display optical an near-UV 'flickering' on timescales of 5-20 min, especially during periods of outbursts. The purpose of this observation was to study the characteristics of the X-ray emission during a symbiotic star 'outburst'.

The ASCA observation of showed a clear detection of CH Cyg from about .7 KeV to about 10 keV (see Figure 1). The spectrum showed significantly more 'hard' X-ray emission (above about 2 keV) than previously seen in CH Cyg or other Symbiotic stars. In addition the Fe K emission line (~6.7 keV) is very strong and may consist of two components. There is some possiblity of short time scale variability of the total X-ray flux, but verification of this will require additional investigation. A preliminary two component blackbody model plus a gaussian Fe K line profile model was fit to the data which gave a kT~0.2 keV and column density of nH~10^22. Additional work is needed to determine the correct system model.

Note that the funds for this contract were primarily used to learn about ASCA data and to install, debug, and learn to use the ASCA data analysis software (ftools, xspec, etc) on our DEC Alpha workstation.

Figure 1

data and folded model CH CYG GTS2